

WE CLAIM:

1       1. A method of screening a patient for cancer, the  
2       method comprising:

3           a) performing an amplification technique on a  
4       sample from a biopsy taken from a patient to produce an  
5       amplified sample, wherein the patient has been determined  
6       to be negative for CIN III, wherein the sample comprises  
7       nucleic acid, and wherein the amplification technique is  
8       specific for amplification of a portion of an HPV  
9       sequence.

1       2. The method of claim 1 wherein the biopsy is obtained  
2       by performing the technique of ductal lavage on a breast  
3       of a patient.

1       3. The method of claim 1 wherein the patient is a  
2       human, wherein the cancer is in any stage of development,  
3       and wherein the cancer is selected from the group

4       consisting of breast, dermal, oral, penile, vulvar  
5       cancer, and any combination thereof.

1       4.    The method of claim 1 wherein the amplification  
2       technique is polymerase chain reaction amplification.

1       5.    The method of claim 1 wherein the amplification  
2       technique is reverse-transcription polymerase chain  
3       reaction amplification.

1       6.    The method of claim 1 wherein the amplification  
2       technique is specific for amplification of a portion of  
3       a HPV sequence selected from the group consisting of  
4       HPV18, HPV31, HPV 33, HPV35, HPV45, HPV58.

1       7.    The method of claim 1 wherein the amplification  
2       technique is specific for amplification of a portion of  
3       at least two HPV sequences selected from the group  
4       consisting of HPV18, HPV31, HPV 33, HPV35, HPV45, HPV58.

1       8. The method of claim 7 wherein one of the at least  
2       two HPV sequences is HPV18.

1       9. The method of claim 1 wherein the amplification  
2       technique is specific for amplification of a portion of  
3       HPV16 and at least one HPV sequence selected from the  
4       group consisting of HPV18, HPV31, HPV 33, HPV35, HPV45,  
5       HPV58.

1       10. A method of screening a patient for cancer, the  
2       method comprising:

3           a) performing an amplification technique on a  
4       sample from a biopsy taken from a patient to produce an  
5       amplified sample, wherein the sample comprises nucleic  
6       acid, and wherein the amplification technique is specific  
7       for amplification of a portion of a HPV sequence selected  
8       from the group consisting of HPV18, HPV31, HPV 33, HPV35,  
9       HPV45, HPV58.

1       11. The method of claim 9 wherein the amplification  
2       technique is specific for amplification of a portion of  
3       at least two HPV sequences selected from the group  
4       consisting of HPV18, HPV31, HPV 33, HPV35, HPV45, HPV58.

1       12. The method of claim 9 wherein the patient is a  
2       human, wherein the cancer is in any stage of development,  
3       and wherein the cancer is selected from the group  
4       consisting of breast, dermal, oral, penile, vulvar  
5       cancer, and any combination thereof.

1       13. The method of claim 9 wherein the biopsy is obtained  
2       by performing the technique of ductal lavage on a breast  
3       of a patient.

1       14. The method of claim 9 wherein the amplification  
2       technique is polymerase chain reaction amplification.

1       15. The method of claim 9 wherein the amplification  
2       technique is reverse-transcription polymerase chain  
3       reaction amplification.

1       16. A method of screening a patient for cancer, the  
2       method comprising:

3           a) performing an amplification technique on a  
4       sample from a biopsy taken from a patient to produce an  
5       amplified sample, wherein the sample comprises nucleic  
6       acid, and wherein the amplification technique is specific  
7       for amplification of a portion of a HPV16 sequence, and  
8       at least one HPV sequence selected from the group  
9       consisting of HPV18, HPV31, HPV 33, HPV35, HPV45, HPV58.

1       17. The method of claim 16 wherein the patient is a  
2       human, wherein the cancer is in any stage of development,  
3       and wherein the cancer is selected from the group  
4       consisting of breast, dermal, oral, penile, vulvar  
5       cancer, and any combination thereof.

1       18. The method of claim 16 wherein the biopsy is  
2       obtained by performing the technique of ductal lavage on  
3       a breast of a patient.

1       19. The method of claim 16 wherein the amplification  
2       technique is polymerase chain reaction amplification.

1       20. The method of claim 16 wherein the amplification  
2       technique is reverse-transcription polymerase chain  
3       reaction amplification.

1       21. A method of screening a patient for a cancer, the  
2       method comprising:

3           a)       contacting cellular material with an HPV  
4       specific probe, wherein the cellular material is  
5       extracted from a biopsy taken from a patient, and wherein  
6       the patient has been determined to test negative for CIN  
7       III.

1       22. The method of claim 21 wherein the cellular material  
2       is derived from cells obtained by performing the  
3       technique of ductal lavage on a breast of a patient.

1       23. The method of claim 21 wherein the cellular material  
2       comprises nucleic acid, polypeptides, or a combination  
3       thereof.

1       24. The method of claim 21 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to the  
3       plus strand of an HPV DNA sequence.

1       25. The method of claim 21 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to a  
3       portion of an HPV mRNA sequence.

1       26. The method of claim 21 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to a  
3       portion of an HPV ribosomal RNA sequence.

1       27. The method of claim 21 wherein the probe is an  
2       antibody specific to an epitope of an HPV protein.

1       28. The method of claim 27 wherein the protein is HPV16  
2       E6 or HPV16 E7.

1       29. The method of claim 21 wherein the HPV is selected  
2       from the group consisting of HPV18, HPV31, HPV 33, HPV35,  
3       HPV45, HPV58.

1       30. The method of claim 21 wherein step a) further  
2       comprises contacting the cellular material with a second  
3       HPV specific probe, wherein the first and second HPV are  
4       different from one another and are selected from the  
5       group consisting of HPV18, HPV31, HPV 33, HPV35, HPV45,  
6       HPV58.

1       31. The method of claim 21 wherein step a) further  
2       comprises contacting the cellular material with a second  
3       HPV specific probe, wherein the first HPV specific probe

4 is specific to HPV 16 and the second HPV specific probe  
5 is specific to at least one HPV selected from the group  
6 consisting of HPV18, HPV31, HPV 33, HPV35, HPV45, HPV58.

1 32. The method of claim 21 wherein the cancer is in any  
2 stage of development, and wherein the cancer is selected  
3 from the group consisting of breast, dermal, oral,  
4 penile, vulvar cancer, and any combination thereof.

1 33. A method of screening a patient for a cancer, the  
2 method comprising:

3 a) contacting cellular material with a probe  
4 specific to a first HPV, and a second probe specific to  
5 a second HPV, wherein the cellular material is extracted  
6 from a biopsy taken from a patient and wherein the first  
7 HPV is HPV 16, and the second HPV is selected from the  
8 group consisting of HPV18, HPV31, HPV 33, HPV35, HPV45,  
9 HPV58.

1       34. The method of claim 33 wherein the cellular material  
2       is derived from cells obtained by performing the  
3       technique of ductal lavage on a breast of a patient.

1       35. The method of claim 33 wherein the cellular material  
2       comprises nucleic acid, polypeptides, or a combination  
3       thereof.

1       36. The method of claim 33 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to the  
3       plus strand of an HPV DNA sequence.

1       37. The method of claim 33 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to a  
3       portion of an HPV mRNA sequence.

1       38. The method of claim 33 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to a  
3       portion of an HPV ribosomal RNA sequence.

1       39. The method of claim 33 wherein the probe is an  
2       antibody specific to an epitope of an HPV protein.

1       40. The method of claim 36 wherein the protein is HPV16  
2       E6 or HPV16 E7.

1       41. The method of claim 33 wherein the cancer is in any  
2       stage of development, and wherein the cancer is selected  
3       from the group consisting of breast, dermal, oral,  
4       penile, vulvar cancer, and any combination thereof.

1       42. A method of screening a patient for a cancer, the  
2       method comprising:

3            a) contacting cellular material with a probe  
4       specific to a HPV selected from the group consisting of  
5       HPV18, HPV31, HPV 33, HPV35, HPV45, HPV58, wherein the  
6       cellular material is extracted from a biopsy taken from  
7       a patient.

1       43. The method of claim 37 wherein step a) further  
2       comprises a second probe specific to a second HPV  
3       selected from the group consisting of HPV18, HPV31, HPV  
4       33, HPV35, HPV45, HPV58, wherein the first and second HPV  
5       are different from one another.

1       44. The method of claim 42 wherein the cellular material  
2       is derived from cells obtained by performing the  
3       technique of ductal lavage on a patient.

1       45. The method of claim 42 wherein the cellular material  
2       comprises nucleic acid, polypeptides, or a combination  
3       thereof.

1       46. The method of claim 42 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to the  
3       plus strand of an HPV DNA sequence.

1       47. The method of claim 42 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to a  
3       portion of an HPV mRNA sequence.

1       48. The method of claim 42 wherein the probe is an HPV  
2       DNA or RNA oligonucleotide sequence complementary to a  
3       portion of an HPV ribosomal RNA sequence.

1       49. The method of claim 42 wherein the probe is an  
2       antibody specific to an epitope of an HPV protein.

1       50. The method of claim 42 wherein the cancer is in any  
2       stage of development, and wherein the cancer is selected  
3       from the group consisting of breast, dermal, oral,  
4       penile, vulvar cancer, and any combination thereof.

1       51. A method of treating a patient comprising:  
2           a) administering a composition comprising an  
3           effective amount of an antisense HPV sequence to a  
4           patient.

1       52. The method of claim 51 wherein administering  
2       comprises delivery of the composition into a milk duct of  
3       a breast of the patient by insertion of a microcatheter  
4       into a nipple surface orifice of said breast.

1       53. The method of claim 51 wherein the HPV is selected  
2       from the group consisting of HPV16, HPV18, HPV31, HPV 33,  
3       HPV35, HPV45, HPV58, and any combination thereof.

1       54. The method of claim 51 wherein the antisense HPV  
2       sequence is expressed from a viral expression vector.

1       55. The method of claim 51 wherein the patient is human  
2       and has a cancer in any stage of development.

1       56. The method of claim 51 wherein the cancer is breast,  
2       dermal, oral, penile, or vulvar cancer, or any  
3       combination thereof.

1       57. A method of treating a patient comprising:

2           a) administering an effective amount of a  
3           composition to a patient, wherein the composition  
4           comprises an agent that inhibits expression of at least  
5           one HPV gene.

1       58. The method of claim 57 wherein administering  
2           comprises delivery of the composition into a milk duct of  
3           a breast of the patient by insertion of a microcatheter  
4           into a nipple surface orifice of said breast.

1       59. The method of claim 57 wherein the agent is an  
2           oligonucleotide comprising antisense HPV DNA, RNA or  
3           ribosomal RNA.

1       60. The method of claim 57 wherein the agent is an  
2           oligonucleotide comprising sequences complementary to the  
3           plus or minus strand of HPV DNA.

1       61. The method of claim 57 wherein the HPV is selected  
2           from the group consisting of HPV16, HPV18, HPV31, HPV33,  
3           HPV35, HPV45, HPV58, and any combination thereof.

1       62. The method of claim 57 wherein the patient is human  
2       and has a cancer in any stage of development.

1       63. The method of claim 57 wherein the cancer is breast,  
2       dermal, oral, penile, or vulvar cancer, or any  
3       combination thereof.

1       64. A method of treating a patient comprising:  
2           a) administering an effective amount of a  
3       composition comprising an agent that specifically  
4       inhibits the HPV16 E6 protein or the HPV16 E7 protein.

1       65. The method of claim 64 wherein administering  
2       comprises delivery of the composition into a milk duct of  
3       a breast of the patient by insertion of a microcatheter  
4       into a nipple surface orifice of said breast.

1       66. The method of claim 64 wherein the agent is an  
2       antibody specific for the HPV16 E6 protein or HPV16 E7  
3       protein.

1       67. The method of claim 64 wherein the patient is human  
2       and has a cancer in any stage of development.

1       68. The method of claim 64 wherein the cancer is breast,  
2       dermal, oral, penile, or vulvar cancer, or any  
3       combination thereof.

1       69. A method of treating a patient comprising:  
2           a) transfecting dendritic precursor cells of a  
3       patient with a recombinant viral vector that drives  
4       expression of an HPV antigen;  
5           b) treating the dendritic precursor cells with a  
6       cytokine to produce dendritic cells stably expressing the  
7       HPV antigen;  
8           c) contacting T cells together with the dendritic  
9       cells stably expressing the HPV antigen to produce primed  
10      T cells; and  
11           d) administering to the patient an effective  
12      amount of either the primed T cells, dendritic cells, or  
13      a combination thereof.

1       70. The method of claim 69 wherein the cytokine is  
2       selected from the group consisting of interluekins, GM-  
3       CSF, TNF, and any combination thereof.

1       71. The method of claim 69 wherein the patient is human,  
2       and wherein the patient has a cancer in any stage of  
3       development.

1       72. The method of claim 71 wherein the cancer is breast,  
2       dermal, oral, penile, or vulvar cancer, or any  
3       combination thereof.

1       73. The method of claim 69 wherein the recombinant viral  
2       vector is an adeno-associated viral vector.

1       74. The method of claim 69 wherein the HPV is selected  
2       from the group consisting of HPV16, HPV18, HPV31, HPV 33,  
3       HPV35, HPV45, HPV58, and any combination thereof.

4       75. The method of claim 69 wherein the HPV antigen is  
5       HPV E6 or HPV E7.

1       76. A kit for screening a patient for a cancer, the kit  
2       comprising:

3           a)    a probe specific for detection of an HPV.

1       77. The kit of claim 77 wherein the probe is a single-  
2       stranded oligonucleotide sequence, a double-stranded  
3       oligonucleotide sequence, a polypeptide, or any  
4       combination thereof.

1       78. The kit of claim 77 wherein the HPV is selected from  
2       the group consisting of HPV16, HPV18, HPV31, HPV35,  
3       HPV45, HPV58, and any combination thereof.

1       79. The kit of claim 77 wherein the patient is human,  
2       wherein the cancer is in any stage of development, and  
3       wherein the cancer is selected from the group consisting  
4       of breast, dermal, oral, penile, vulvar cancer, and any  
5       combination thereof.

1 81. The composition of claim 80 wherein the sequence is  
2 selected from the group consisting of single-stranded  
3 nucleic acids, double-stranded nucleic acids,  
4 polypeptides, and any combination thereof.

1 82. The composition of claim 80 wherein the HPV sequence  
2 is selected from the group consisting of HPV 16, HPV 18,  
3 HPV 31, HPV 33, HPV 35, HPV 45, HPV58, and any  
4 combinations thereof.

1 83. The composition of claim 80 wherein the HPV sequence  
2 is HPV16 and any one of the group consisting of HPV 18,  
3 HPV 31, HPV 33, HPV 35, HPV 45, HPV58, and any  
4 combinations thereof.

1       84. The composition of claim 80 wherein the HPV sequence  
2       is HPV 18 and any one of the group consisting of HPV 16,  
3       HPV 31, HPV 33, HPV 35, HPV 45, HPV58, and any  
4       combinations thereof.

1       85. The composition of claim 80 wherein the HPV sequence  
2       is a combination of HPV 16 and HPV 18.

1       86. The composition of claim 80 wherein the HPV sequence  
2       is a combination of HPV 16 and HPV 18 and at least any  
3       one of the group consisting of HPV 31, HPV 33, HPV 35,  
4       HPV 45, HPV58, and any combinations thereof.

1       87. The composition of claim 80 wherein the HPV sequence  
2       is a combination of HPV 16, HPV 18 and HPV 33, and at  
3       least any one of the group consisting of HPV 31, HPV 35,  
4       HPV 45, HPV58, and any combinations thereof.